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TERTIARY DEER DISCOVERED BY THE AMERICAN MUSEUM ASIATIC EXPEDITIONS[1]

By Edwin H. Colbert

INTRODUCTION

Among the fossils procured by the Central Asiatic Expeditions of The American Museum of Natural History are numerous small antlers, more or less complete, that would seem to be representative of several new types of deer. These fossils were found by the Expedition of 1930 in the Tung Gur formation of Upper Miocene age, and they all came from localities east of Iren Dabasu, just south of the boundary between Inner and Outer Mongolia.

The author wishes to express his indebtedness to Dr. Walter Granger, palaeontologist of the Central Asiatic Expeditions, for permission to study and describe these fossil deer.

Subfamily **Cervulinae**

STEPHANOCERAS, NEW GENUS

στεθανος = a crown; κερας = horn.

An upper Tertiary cervuline of small size, characterized by a palmate antler with a moderately long pedicle. The antler may have but a few tines, or it may have several, projecting out from the palmate central portion. The genus is known from the antlers alone.

Generic Type.—*Stephanoceras thomsoni.*

Stephanoceras thomsoni,[2] new genus and species

Figures 1, 2, 3a–h 4, 5 and 7A

Type.—Amer. Mus. No. 26782, a right antler, complete except for the pedicle.

Paratypes.—Amer. Mus. Nos. 26778, a right antler of a young individual; 26779, a right antler of a young individual; 26780, a left antler; 26781, a left antler; 26783, a left antler; 26784, a right antler; 26785, a right antler of an aged individual; 26786, a right antler; 26787, a left antler; 26788, a right antler; 26789, a left antler; 26790, several pedicles with fragments of antlers or frontlets attached; 26791, numerous fragmentary antlers; 26792, fragments of antlers.

Horizon.—From the Tung Gur formation of Upper Miocene age.

Locality.—All of the specimens came from one locality, about sixty miles east

[1] Publications of the Asiatic Expeditions of The American Museum of Natural History. Contribution No. 131.

[2] Named in honor of Mr. Albert Thomson of The American Museum of Natural History, who was a member of the 1928 and 1930 field parties in Mongolia.

of Iren Dabasu on the Kalgan–Urga trail, and about twenty-five miles northeast of Gur Tung Khara Usu, Inner Mongolia.

DIAGNOSIS.—Antler broadly palmate with an average of six or eight tines in the adult. Antler supported on a rather long, heavy pedicle, which joins the antler in the middle of the palmate portion.

DESCRIPTION.—Unfortunately no skull bones or teeth were found, so that this genus and species are known from antlers only. There is, however, quite a large series of antlers in the collection made by the Asiatic Expedition, so we are able at least to obtain a very good knowledge of the variability and the age changes in the material at hand.

As set forth in the diagnosis of the genus and species, the antler is typically broadly palmate, set on a long pedicle. It may have a few tines, or it may have several, all projecting out from the palmate central portion of the antler. Invariably there is an anterior tine, one might call it a "brow tine" projecting outward and forward. The other tines are arranged around the edge of the palmate central portion of the antler, so that they project out in all directions. Posteriorly the palmate portion of the antler is continued back in line with the median axis, and it terminates in two points or tines. Thus the antler might be said to have a long antero-posterior axis, with a single outwardly directed brow tine at the front and a broad double pointed posterior termination, and with various tines arranged along either side. The numerous points or tines tend to curve up at their tips, and the palmate central portion of the antler is somewhat cup shaped, as if the entire structure were molded over an irregularly oblate spheroid. The pedicle is long, as compared to a typical cervid pedicle, but short, as compared to a cervuline pedicle.

DISCUSSION.—The variations in antler form in this genus and species are numerous, and they will be discussed at length in succeeding paragraphs.

At this point it may be well to consider briefly the relationships of the form under consideration. At once we are confronted with certain conflicting characters, so that the proper classification of the genus and species is somewhat problematical. From the elongated pedicle, it would seem as if *Stephanoceras* might be placed among the Cervulinae, the primitive deer of which the muntjacs are the modern representatives. But then the cervulines are characterized by simple antlers, almost invariably with only two, or at the most three, prongs above the pedicle, whereas the form under discussion has really highly developed antlers with numerous prongs. These well-developed antlers might be brought forward as an argument for placing the genus *Stephanoceras* in the

ERRATUM

(American Museum Novitates, No. 854)

After this paper went to press, P. Teilhard de Chardin called my attention to the fact that the name *Stephanoceras* is preoccupied by *Stephanoceras* Waagen, 1869, a cephalopod. Therefore the name *Stephanoceras* as used in the present paper is to be replaced by *Stephanocemas*. στέφανος- a crown; κέμας- a young deer. *Stephanocemas thomsoni* is the generic type.

Edwin H. Colbert

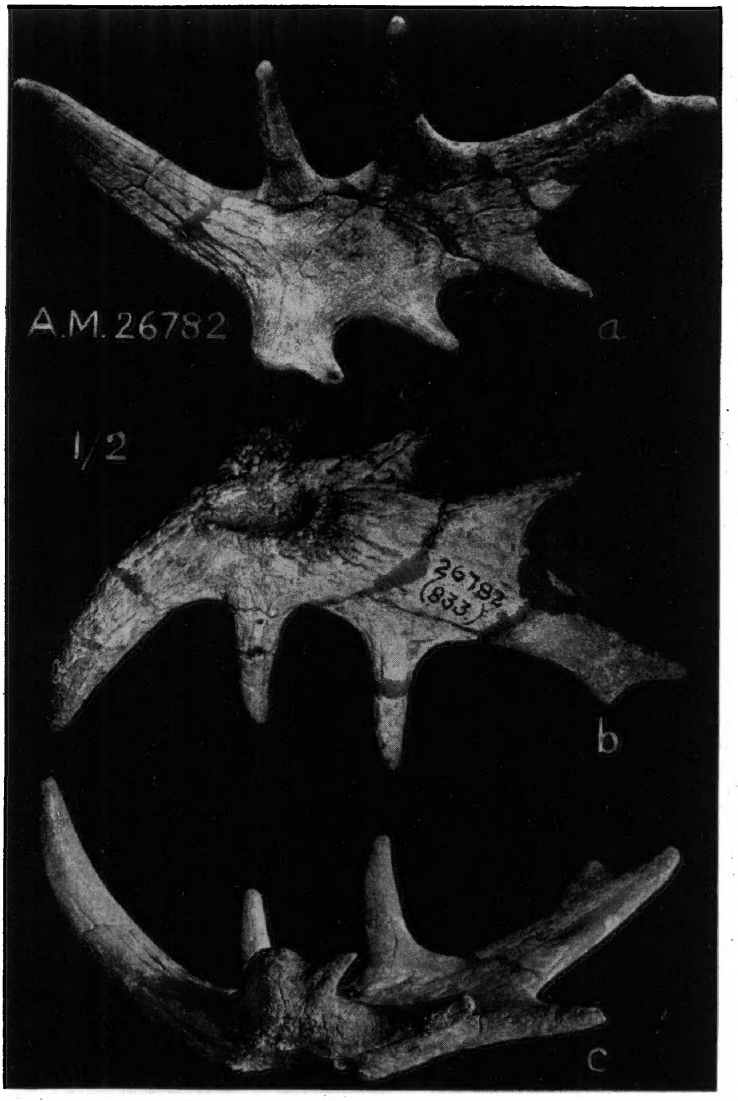


Fig. 1. *Stephanoceras thomsoni*, new genus and species. Type, Amer. Mus. No. 26782, right antler. a.—Dorsal view. b.—Ventral view, showing pedicle scar. c.—Internal lateral view. One-half natural size.

Cervinae. The Cervinae, however, are characterized by very short pedicles. It is true, of course, that some Cervinae, notably the hog deer (*Cervus porcinus*) have rather long pedicles, but even in these forms the pedicles are proportionately shorter than they are in the Cervulinae.

Thus there is evidence for classifying the antlers from Mongolia either with the Cervulinae (on the basis of the long pedicle and the general small size of the animal) or with the Cervinae (on the basis of the rather complicated antler). It would seem probable, that the arguments in favor of *Stephanoceras* being a true cervuline are stronger than those in favor of placing it with the cervines. Therefore the genus is placed in the Cervulinae in this paper. It is regarded as a rather specialized member of the subfamily, in which a complicated antler was precociously developed at a comparatively early date in the phylogenetic history of the group.

Age Changes and Individual Variations in the Antlers of *Stephanoceras*

A great range of antler form in *Stephanoceras thomsoni* is shown by the material in the American Museum collection. Part of this diversity may be attributed to changes due to increasing age in the life of the individual, while factors of individual variation may be invoked to account for such differences as exist in antlers of comparable age and development. Let us first consider the problem of change in antler form due to increasing age in the life of the individual.

By means of a careful selection from the large amount of material at hand, a series, probably representative of changes taking place in the growth from adolescence to old age, has been arranged. At the one end, presumably that of the early life of the animal, the antlers are small and relatively simple, with but few points. At the other end, representative of the advanced age in the animal, the antlers are large and heavy, with but few points. Intermediate between these two extremes, the antlers are of medium size to large size, with many points and a rather complex pattern. Thus it would seem logical to suppose that the young *Stephanoceras* buck had small, simple antlers, with but few points on them. As he advanced in age the antlers became larger and larger, and the points increased in number. Finally, as old age set in, the antlers began to lose points, but they remained large, and it was only with extreme old age that the antlers decreased in size to any appreciable degree. This supposed sequence of age changes is shown by the accompanying illustration (Fig. 5).

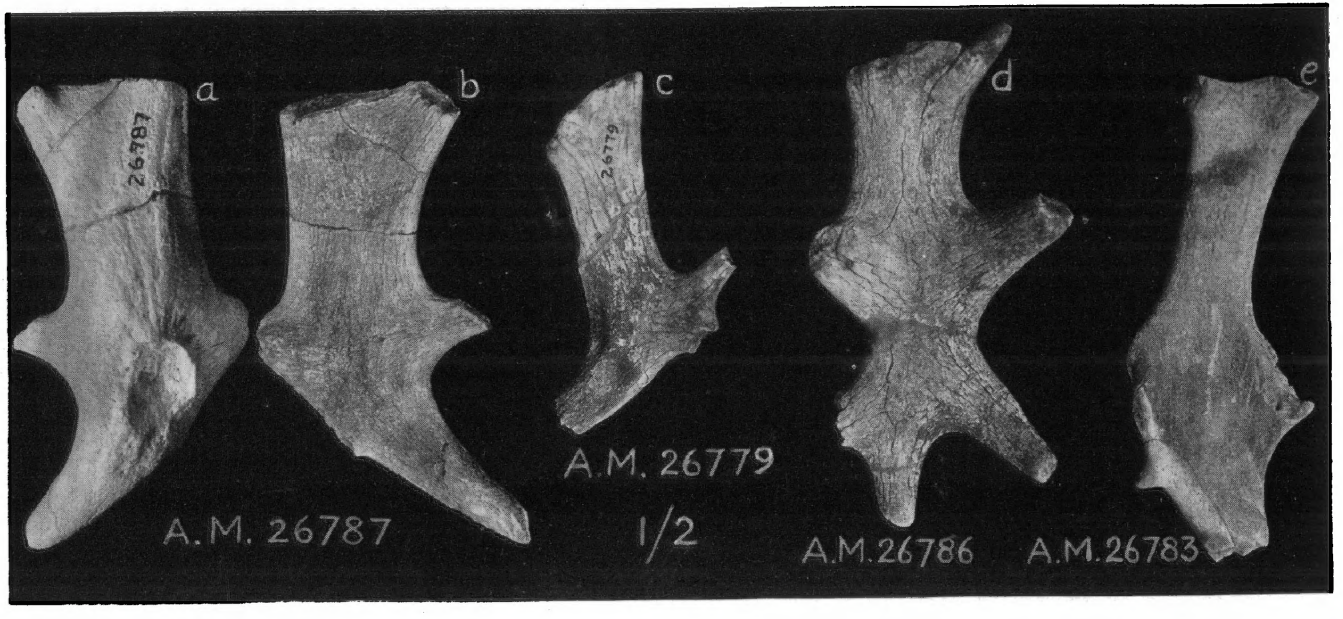


Fig. 2. *Stephanoceras thomsoni*, new genus and species. Amer. Mus. No. 26787, left antler. a.—Ventral view. b.—Dorsal view. Amer. Mus. No. 26779, right antler of a young individual. c.—Dorsal view. Amer. Mus. No. 26786, right antler. d.—Dorsal view. Amer. Mus. No. 26783, left antler. e—Dorsal view. All figures one-half natural size.

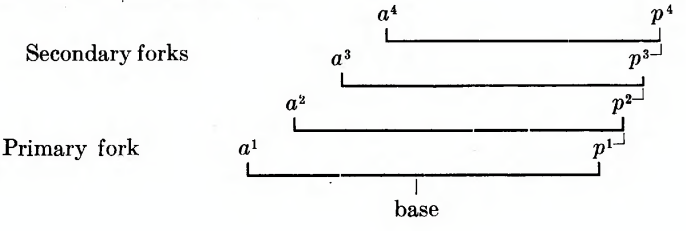
In this illustration the various stages in the growth of the antler are numbered. These numbers are arbitrary. The sequence from I to X is supposed to represent the age changes from adolescence to old age and the stages between IV and VII represent the prime of life period.

An attempt is made here to analyze the antler of *Stephanoceras* on the basis of the probable homologies of its points. This analysis has for its foundation the paper published in 1878 by Victor Brooke on the "Classification of the Cervidae," and the more recent paper, published by R. I. Pocock in 1933 on "Homologies between Branches of the Antlers of the Cervidae." Both Brooke and Pocock proposed systems of nomenclature for the cervid antler, based on their careful and extended studies of numerous genera and species of deer. Both of the nomenclatorial systems advocated by these two authors are essentially similar to each other, but that of Pocock is probably the more logical of the two.

Pocock, as a result of his studies, concluded that the cervid antler attains its ultimate form, no matter how varied that may be in the numerous genera and species, by a process of dichotomous growth. Therefore all of the seemingly different types of deer antlers may be traced back to one simple, common form, and their great diversity may be attributed to various developments of this basic pattern.

According to Pocock, the primitive cervid antler is a simple dichotomously branched structure, consisting of a single anterior prong and a single posterior prong. These two prongs he has designated "*a*" (anterior) and "*p*" (posterior), respectively. Now the complex antlers found in most of the advanced cervidae are formed by further multiple dichotomous branching of the primary prong "*p*." Thus if the *p* prong branches once a relatively simple antler like that of the Sambar deer is formed. As the *p* prong branches more and more, progressively complex antlers are formed. Rarely does the anterior basic prong "*a*" branch, for obviously it is mechanically disadvantageous for this front branch, projecting out over the eye, to be large and cumbersome.

Following this system of nomenclature, the deer antler may be analyzed in the following manner.



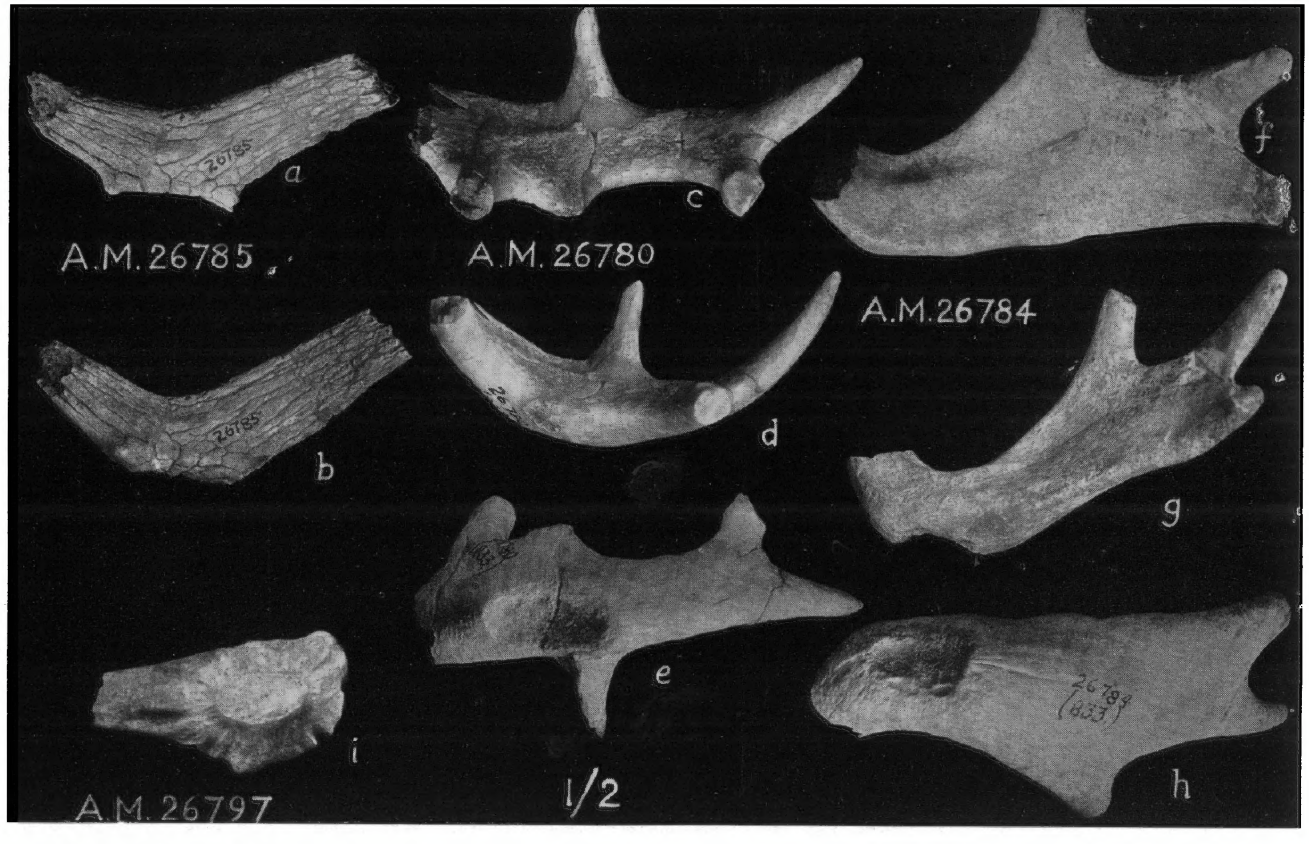


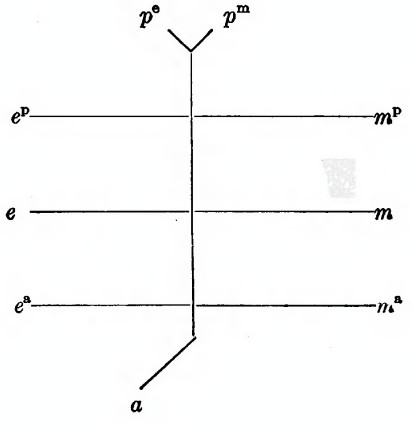
Fig. 3. a–h. *Stephanoceras thomsoni*, new genus and species. Amer. Mus. No.26785, right antler of an aged individual. a.—Dorsal view. b.—Internal lateral view. Amer. Mus. No. 26780, left antler. c.—Dorsal view. d.—Internal lateral view. e.—Ventral view. Amer. Mus. No. 26784, right antler. f.—Dorsal view. g.—Internal lateral view. h.—Ventral view.

3. i. *Dicrocerus grangeri*, new species. Amer. Mus. No. 26797, antler base. Ventral view.

All figures one-half natural size.

This system of nomenclature may be applied with great facility to the usual types of modern and fossil deer antlers, in which the branching is dichotomous through vertical components. But the antler of *Stephanoceras* is peculiar in that it branches in a horizontal rather than in a vertical manner. Consequently Pocock's system of nomenclature is not so easily applicable to these antlers from Mongolia. Of course the above system may be applied to the *Stephanoceras* antler in a general way, by designating the single anterior tine the primary "*a*" prong and supposing the rest of the antler, that is the palmate portion with its several tines projecting outwardly, inwardly and posteriorly to be homologous with the primary "*p*" prong. It is convenient, however, to have separate designations for these several tines in the antler of *Stephanoceras*, in order that we may compare different antlers with each other and trace the development of their component parts.

Therefore I propose to call the single anterior tine *a*, supposing it to be homologous with the "*a*" tine in other Cervidae. The backward projecting broad portion of the *Stephanoceras* antler is designated as *p*, and when this portion of the antler shows two terminal prongs, as it often does, these are designated as p^e and p^m, depending on their external or median positions. The tines projecting laterally from the palmate portion of the antler, although their homologies are with the "*p*" portion of the normal cervid antler, deserve separate names, so I propose to call those on the external side of the antler *e*, and those on the internal side (or median side) *m*. The individual tines may be indicated by secondary letters, according to whether they are anterior or posterior in position, thus: e^a, e^p, m^a, m^p. With these considerations in mind the *Stepha-*



noceras antler may be analyzed in the following manner, as seen in the dorsal or superior view.

The centrally placed lateral prongs, that is the *e* and *m* prongs, are located above the posterior border of the pedicle or pedicle scar. In the accompanying diagram (Fig. 5) the posterior border of the pedicle or pedicle scar is, in each case, placed on the line A–B. Thus a definite datum point, so to speak, is located on each antler, and this facilitates comparisons of antlers of different sizes and shapes with each other.

An examination of the figure just cited will show that throughout the

Fig. 4. *Stephanoceras thomsoni*, new genus and species. Amer. Mus. No. 26790. Antler pedicles. a.—Internal view. b.—Anterior view. c.—Internal view. One-half natural size.

life of the individual *Stephanoceras* the primary portions of the antler continue without fundamentally changing their relations to each other. Thus the portions *a* and *p* continue to remain as constants during the life of the animal. It is by the growth and the subsequent decline of the lateral tines, the various *e* and *m* tines according to the above proposed system of nomenclature, that the changes from adolescence through the prime of life to old age are marked. The very young *Stephanoceras* antler usually has a single *e* tine and a single *m* tine, one on either side. As the animal approaches maturity the *e* and *m* tines increase in number, and the primary *p* prong becomes strongly divided at its apex. As old age approaches the *e* and *m* tines decrease, so that in extreme old age

they may disappear altogether. Stages I to X of the figure give a graphic representation of the changes described above.

Comparison of *Stephanoceras* with Other Cervidae

The distinguishing character of the *Stephanoceras* antler is the relationship of the beam, or upper portion, to the pedicle. In most of the deer the beam is more or less of an upward continuation of the pedicle. In those forms having palmate antlers, the palmate portion is an outgrowth, so to speak, of the beam. Thus in the elk or moose (*Alces*), the antler is broadly palmate distally, but there is always a short section of round beam at the proximal junction of the antler with the pedicle.

In *Stephanoceras*, on the other hand, the pedicle joins the antler in the middle of the palmate portion. That is, the palmate antler in this genus is supported on the pedicle just as the cup of a wine glass is supported on its stem. Consequently *Stephanoceras* would seem to differ in this respect from any of the other known genera of Cervulinae or Cervinae. *Cervocerus*, *Procervus*, *Dama* and *Alces* have palmate antlers but in these genera the palmate portion is developed at the distal end of the beam, of which the proximal end is round in cross section.

Undoubtedly this antler form in *Stephanoceras* was developed independently from a less specialized and more primitive antler. We may imagine the evolution of the *Stephanoceras* antler to have followed the course outlined below.

The ultimate ancestral form (in which any antlers were present) probably had a simple forked antler, consisting of an anterior and a

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Caption for Fig. 5

Fig. 5. Diagram illustrating ten supposed stages in the ontogenetic growth of the antler of *Stephanoceras thomsoni*. Stage I represents the probable form of the first antler in a young individual. Stage X represents a supposed senescent antler from an aged animal. Stages IV to VII show the development of the antler through the prime of life.

The tines of the antler are designated in the following manner.

a—anterior tine
e—external tines
e^a, e^p—anterior and posterior external tines
m—median or internal tine
m^a, m^p—anterior and posterior median tines
m^1,m^2—branches of the median tine
p^e, p^m—external and median posterior tines

The line A—B is tangential to the posterior edge of the pedicle scar in each case. Diagram to scale, one-half natural size.

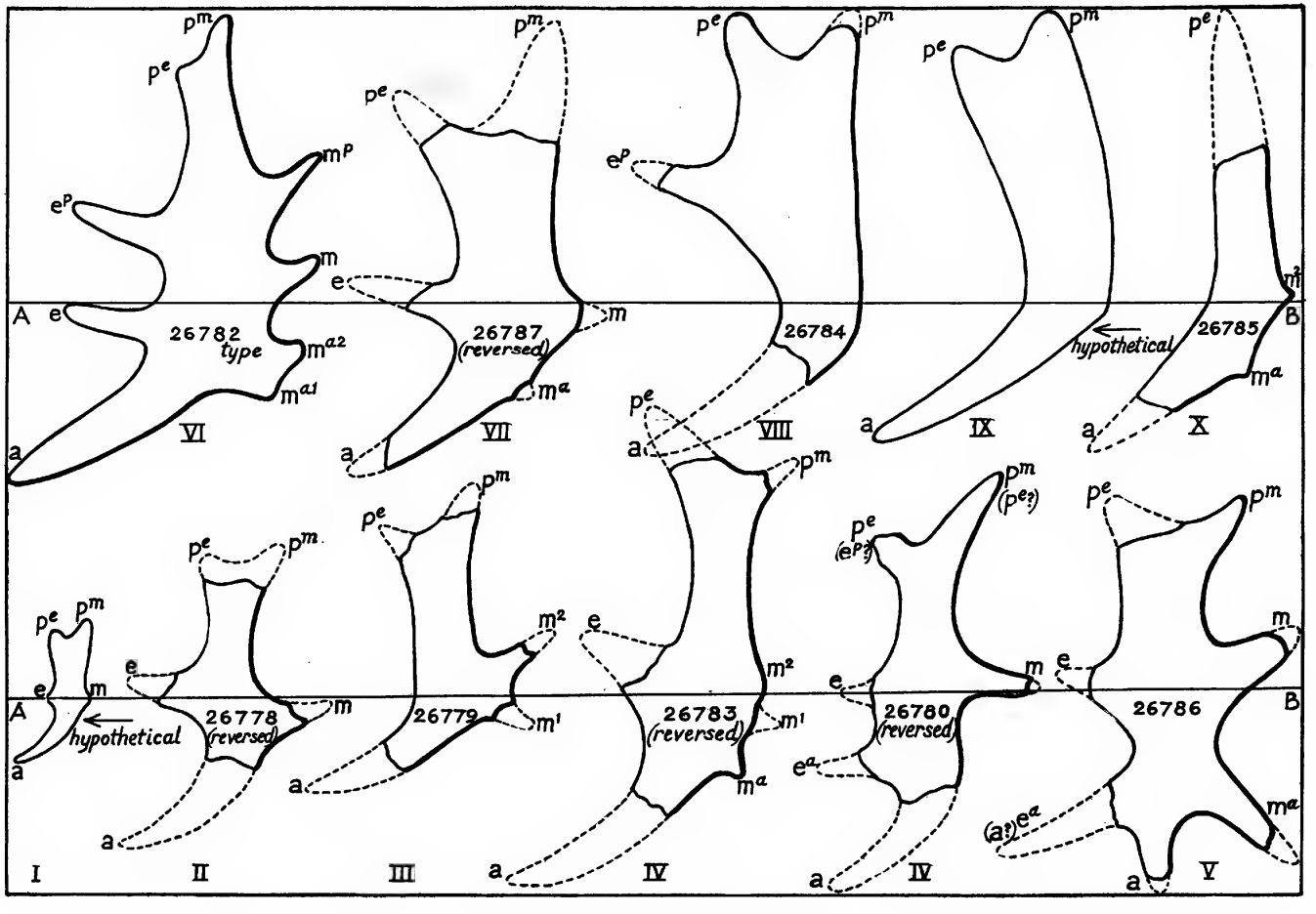


Fig. 5. (See opposite page.)

posterior prong. The anterior prong remained simple, but the posterior one was broadened transversely so that it became more or less palmate. At the same time it was depressed, as was the anterior prong, so that instead of being vertical, it assumed an horizontal position. Tines projected from the palmate portion. In the course of this evolutionary development the original round beam, which was probably very short, was entirely suppressed, so that finally the pedicle joined the palmate antler without the interposition of a round beam.

MEASUREMENTS

Stephanoceras thomsoni

	Ant.-post. dia. pedicle scar	Trans. dia. pedicle scar	Length, juncture of *a* tine to tip of *p* tine	Length of *a* tine	Greatest width palmate portion
Amer. Mus. No.					
26782—type	24 mm.	16 mm.	131 mm.	80 mm.	38 mm.
26780	28	14	114		31
26783	22	13			35
26784	23	13	132		40
26785	21	15			23
26786	35	13			29
26787	22	14			33
26779	10	18			20

	Length of pedicle	Ant.-post. dia. of pedicle	Trans. dia. of pedicle
26790	50 mm.	22 mm.	18 mm.
	42	21	18

Stephanoceras triacuminatus,[1] new species

Figures 6 and 7B

TYPE.—Amer. Mus. No. 26775, a left antler and pedicle, with a small portion of the frontal.

PARATYPES.—Amer. Mus. 26776, a right antler without the pedicle. Amer. Mus. No. 26777, two fragmentary antlers.

HORIZON.—From the Tung Gur formation of Upper Miocene age.

LOCALITY.—The type was found at a point about thirty-five miles east of Iren Dabasu on the Kalgan–Urga trail, and about five miles west of Gur Tung Khara Usu,

[1] So named because of the three strong tines or points arising from the central portion of the antler.

Inner Mongolia. The paratypes came from a locality about twenty-five miles northeast of Gur Tung Khara Usu.

DIAGNOSIS.—Antler structurally similar to the antler of *Stephanoceras thomsoni*, but with a restricted palmate portion and with three tines or prongs projecting posteriorly and laterally. Antler supported on a very long pedicle, which joins the antler in the middle of the palmate portion.

DESCRIPTION.—As is the case in *Stephanoceras thomsoni*, the species now under consideration is known only from the antlers.

The antler of *Stephanoceras triacuminatus* is structurally similar to the antler of the generic type; that is, it consists of tines or prongs projecting radially from a palmate central portion, which in turn rests directly on an elongated pedicle. The palmate portion is, however, much smaller than is the homologous portion in *Stephanoceras thomsoni*, and the prongs that project posteriorly and laterally from it are definitely limited to three in number. These three prongs are of subequal length and they are more or less evenly arranged so that they diverge from each other at angles of from forty to fifty degrees. In the type the outer one of these three tines is bifid at its terminus.

The front border of the antler has several small knobs along its edge. In one of the paratypes, No. 26776, there are two of these knobs and they are of rather large size, whereas in another paratype, No. 26777, there are five small knobs.

The pedicle is very long, much longer than is the case in *Stephanoceras thomsoni*. Since there is but one specimen with a pedicle, no definite conclusions may be drawn as to the variability of this structure in the species under consideration. It may be quite possible that some individuals had much shorter pedicles than does the type of the species. The pedicle joins the palmate antler in the center of the palmate portion, without the interposition of a round beam, as is the case in the generic type. Thus the antler rests on the pedicle as the bowl of a goblet rests on its stem, a comparison that was made in connection with the foregoing species. The pedicle was seemingly vertical, or nearly so.

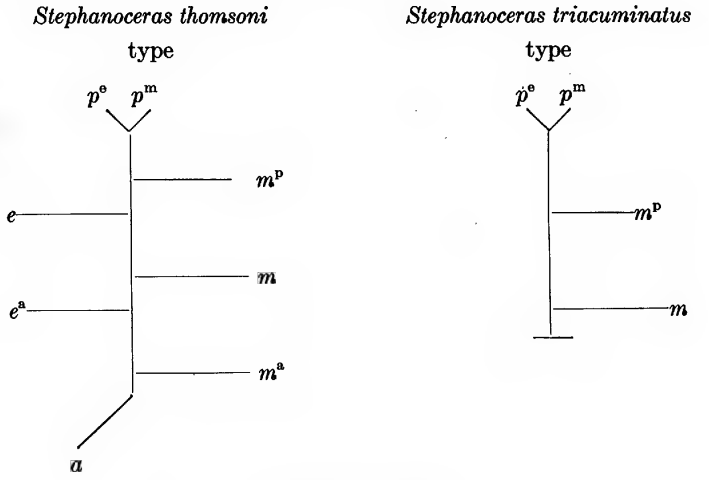
A DIAGNOSIS OF THE ANTLER IN *Stephanoceras triacuminatus*

In *Stephanoceras thomsoni* the tines on the antler are variable in number, being few in the young individual, numerous in the adult and less numerous in the aged animal. In *Stephanoceras triacuminatus* the long tines, as differentiated from the anterior knobs, would seem to be limited to three in number. Of these, the external one, which is bifid in the type, would seem to be homologous with the *p* tine of *Stephanoceras*

Fig. 6. *Stephanoceras triacuminatus*, new species. Type, Amer. Mus. No. 26775, left antler and pedicle. a.—Anterior view. b.—External lateral view. c.—Dorsal view. Amer. Mus. No. 26776, right antler. d.—Dorsal view. Amer. Mus. No. 26777, left antler. e.—Dorsal view. All figures one-half natural size.

thomsoni. The other two tines are therefore probably homologous with the median tines of the generic type, probably with tines *m* and m^p of the type of *Stephanoceras thomsoni*. The front knobs in *Stephanoceras triacuminatus* may be homologous in part with the *a* tine of *Stephanoceras thomsoni*, or they may not have any particular homologies in the generic type.

A comparative analysis of the antlers in the types of the two species of *Stephanoceras* so far described, gives the following results.



MEASUREMENTS

Stephanoceras triacuminatus

Amer. Mus. No. 26775—type	
Length of pedicle	125 mm.
Ant.-post. dia. of pedicle	21
Trans. dia. of pedicle	19
Ant.-post. length of antler	87
Amer. Mus. No. 26776	
Ant.-post. dia. of pedicle scar	22
Trans. dia. of pedicle scar	16
Ant.-post. length of antler	97

DICROCERUS LARTET, 1837

GENERIC TYPE.—*Dicrocerus elegans* Lartet.

Dicrocerus grangeri,[1] new species

Figures 3i and 8

TYPE.—Amer. Mus. No. 26793, a left antler.

PARATYPES.—Amer. Mus. Nos. 26794, a right antler; 26795, base of a left antler;

[1] Named in honor of Dr. Walter Granger of The American Museum of Natural History.

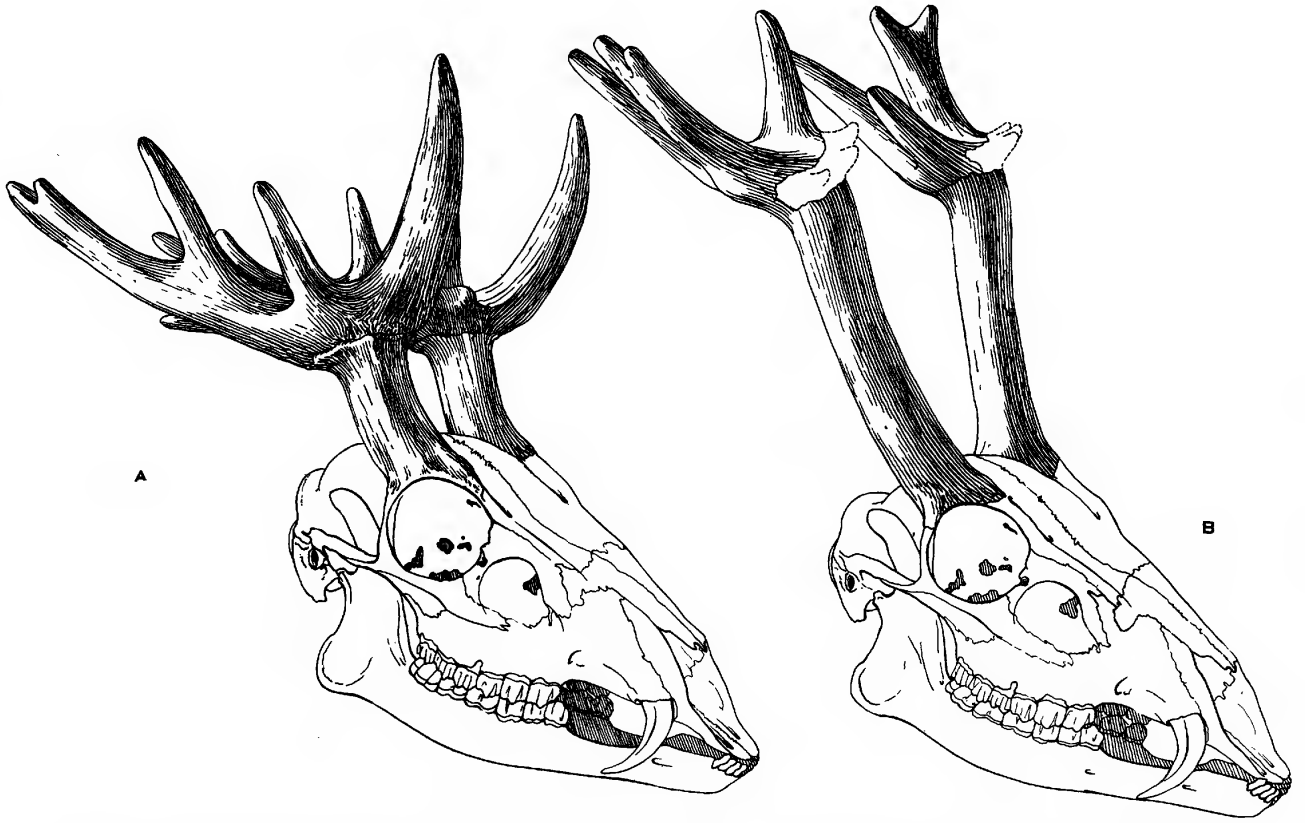


Fig. 7. Perspective views of (A) *Stephanoceras thomsoni* and (B) *Stephanoceras triacuminatus*, to show the position of the antlers on the skull in each of these species. The skulls shown here are drawn from the skull of a recent muntjac. The antlers and pedicles of *Stephanoceras thomsoni* are drawn from Amer. Mus. Nos. 26782, the type antler, and 26790, a pedicle. The antlers and pedicles of *Stephanoceras triacuminatus* are drawn from Amer. Mus. No. 26775, the type antler. The restored portion of this latter antler, shown by dotted lines, is based on a study of Amer. Mus. Nos. 26776 and 26777. Drawn by Louise W. Germann.

26796, base of a left antler with pedicle and portion of frontal; 26797, two antler bases from young individuals; 26798, fragmentary antlers.

HORIZON.—From the Tung Gur formation of Upper Miocene age.

LOCALITY.—A locality about sixty miles east of Iren Dabasu on the Kalgan–Urga trail, and about twenty five miles northeast of Gur Tung Khara Usu, Inner Mongolia.

DIAGNOSIS.—Antler bifurcate and with a broad base. Considerably larger than the typical species of *Dicrocerus*. Prongs of antler very heavy and keeled, diverging from each other at an angle of about fifty degrees in a fore and aft plane. Pedicle of medium length and heavy.

DESCRIPTION.—This species is known from antlers only.

The reference of the antlers, assigned to this new species, to the genus *Dicrocerus* is provisional, because certain differences would seem to separate this species from the typical members of the genus. In *Dicrocerus elegans*, for instance, the two prongs of the antler generally join to form a short but nevertheless recognizable beam, round in cross section. At the base of this beam, where the antler joins the pedicle, there is a well-developed burr, forming a collar between the antler and the pedicle. In some specimens of *Dicrocerus elegans*, however, the beam is not present, and the two prongs, instead of being closely appressed at their juncture, are rather separated from each other.

In *Dicrocerus grangeri* the two prongs of the antler join in a broad, flattened base. As seen from the ventral aspect the antler base of *Dicrocerus grangeri* is similar to the antler base (in the vicinity of the pedicle) of *Stephanoceras thomsoni*. That is, the entire antler base of the species under consideration forms a sort of hemispherical cup, on which, in the middle of the convex side, there is an elliptical depression marking the area of juncture between the pedicle and the antler The reader is referred to the accompanying illustration (Fig. 8) for a portrayal of the points described in the preceding sentences.

The two prongs of the antler are somewhat separated from each other where they join the base, a contrast to the typical *Dicrocerus* antler, in which an antero-posterior ridge joins the prongs at some distance above the base of the antler.

The two prongs of the antler in *Dicrocerus grangeri* are laterally compressed, or rather the compression is oblique to their antero-posterior dimensions, and this compression has caused the prongs to be keeled on opposite sides. The prongs diverge from each other at an angle of about fifty degrees, although in one specimen No. 26794, the divergence is less, and they are inclined away somewhat from the median line of the skull. The prongs are very long.

Fig. 8. *Dicrocerus grangeri*, new species. Type, Amer. Mus. No. 26793, left antler. a.—Dorsal view. b.—Internal lateral view. Amer. Mus. No. 26794, right antler. c.—Dorsal view. d.—External lateral view. Amer. Mus. No. 26795, base of left antler. e.—Dorsal view. Amer. Mus. No. 26796, base and pedicle of left antler. f.—External lateral view. Amer. Mus. No. 26797, antler. g.—Internal lateral view. All figures one-half natural size.

The pedicle is closely comparable to the pedicle in *Stephanoceras thomsoni*, being of medium length, stout and slightly curved.

The species under discussion is placed in the genus *Dicrocerus* for the sake of convenience, with a full realization that it may prove to belong to some other genus of the Cervulinae. The resemblances between the antler bases of *Dicrocerus grangeri* and *Stephanoceras thomsoni* would seem to indicate that these two forms are closely related to each other.

MEASUREMENTS

Dicrocerus grangeri

	Ant.-post. dia. pedicle scar	Trans. dia. pedicle scar	Trans. dia. base of antler
Amer. Mus. No.			
26793—type	22 mm.	14 mm.	42 mm.
26794	25	15	40
26795	22	15	56

	Length of pedicle	Ant.-post. dia. of pedicle	Trans. dia. of pedicle
26796	62	26	23

Dicrocerus sp.

Figures 9 and 10

SPECIMENS UNDER CONSIDERATION.—Amer. Mus. Nos. 26799, the basal portion of an antler; 26800, various fragments of antlers.

HORIZON.—From the Tung Gur formation of Upper Miocene age.

LOCALITY.—These specimens were collected on a small knoll, about sixty miles east of Iren Dabasu on the Kalgan–Urga trail, and about twenty-five miles northeast of Gur Tung Khara Usu, Inner Mongolia.

DIAGNOSIS.—Antlers bifurcated with the two simple tines diverging at an angle of about fifty degrees. A well-developed burr is present at the base of the antler, where it joins the pedicle. Pedicle of unknown length, but presumably long. Antler closely comparable to the antlers of *Dicrocerus elegans*.

A number of antlers among the collection of Mongolian fossil Cervidae may be compared directly with the antlers of the well-known European form, *Dicrocerus elegans* Lartet. In size and shape the antlers of these Asiastic specimens bear close resemblances to the antlers of *Dicrocerus*. They are characterized by their simple, bifurcated form, the two tines diverging in a fore and aft plane, and by the well-developed burr at the base of the antler, where it joins the pedicle. A very large specimen, No. 26799, shows the structure of the base of the antler very well. Other specimens, grouped under the number 26800, illustrate

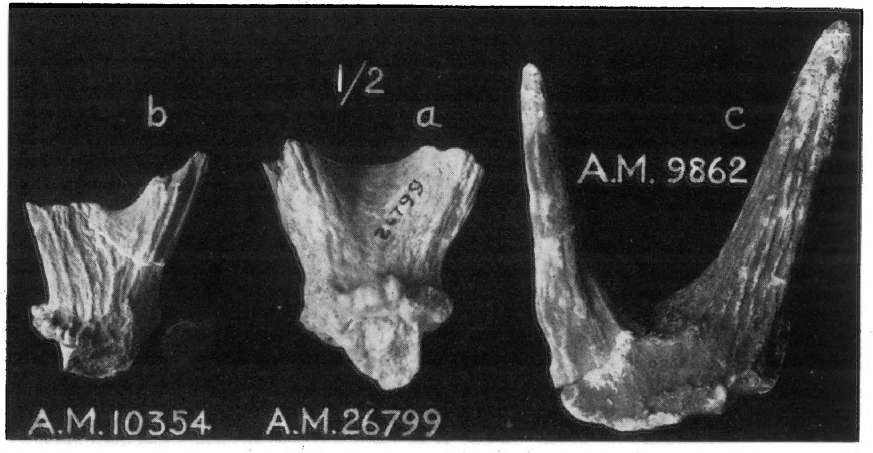


Fig. 9. a. *Dicrocerus* sp. Amer. Mus. No. 26799, base of antler. External lateral view.

b–c. *Dicrocerus elegans* Lartet. Amer. Mus. Nos. 10354 and 9862, antlers. Internal lateral views.

All figures one-half natural size.

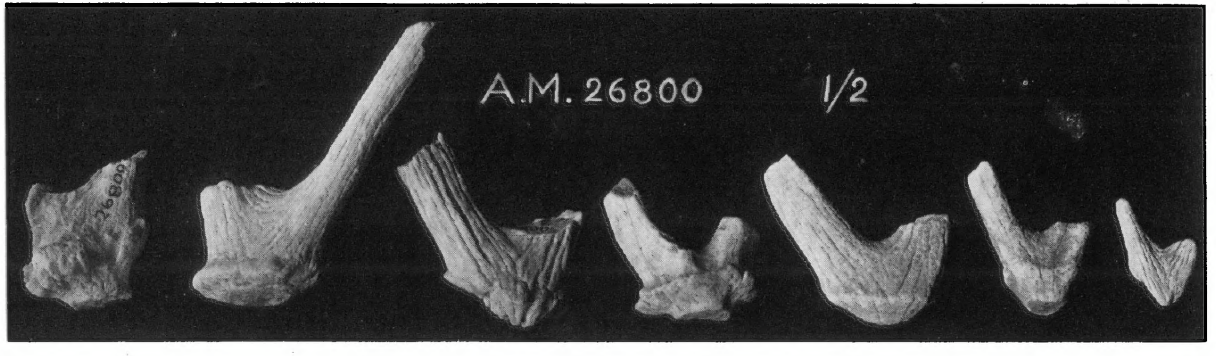


Fig. 10. *Dicrocerus* sp. Amer. Mus. No. 26800. Series of antlers to show increase of size, due to growth. All figures one-half natural size.

various stages in the growth of the antler in the genus under consideration.

It has not been thought advisable to assign a specific name to these few fragmentary antlers of *Dicrocerus*. Figures of some of the specimens listed and described in the foregoing paragraphs are shown in the accompanying illustration.

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